



# M1535D

## South Bridge

Product Brief

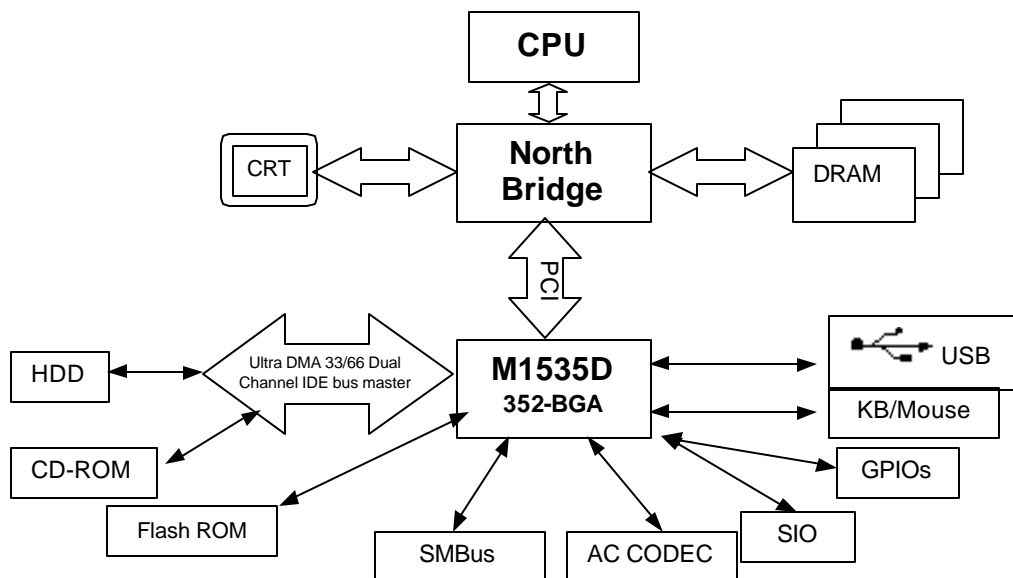
### Introduction

The M1535D provides the best desktop system solution. The M1535D integrates AC-Link Host Controller, Hardware SoundBlaster Pro/16 compatibility, Host Signal Processing (HSP) software modem solution, ACPI support, green function, 2-channel dedicated ATA/UDMA-66 IDE Master controller, 4-port USB controller, SMBus controller, PS/2 Keyboard/Mouse controller, the Super I/O (Floppy Disk Controller, 2 serial port/1 parallel port) support and Fast IR into one chip.

The built-in I/O in M1535D is an advanced Super I/O controller solution to the basic IBM PC, XT, AT peripherals. It incorporates three full function universal asynchronous receiver/transmitters (UARTs), a flexible high performance internal data separator with send/receive 16 byte FIFOs. It is also suitable for notebook computers since it has Fast Infra Red for wireless communications with other devices. It can swap the floppy drives A & B. It supports SPP, PS/2, EPP and ECP parallel port. It also has a programmable baud rate generator. It has high performance power management for the FDC, UART and the parallel port.

The built-in audio in M1535D is an advanced PCI audio accelerator providing wave table synthesis, DirectMusic, DirectSound, and DirectSound3D for the high performance, cost-sensitive consumer market. It also supports full Sound Blaster compatibility and is fully PC 98/PC 99 compliant. In the legacy DOS game environment, the M1535D audio accelerator provides SoundBlaster Pro/16 compatibility, OPL2 and OPL3 emulation, and 1 to 8 MB of general MIDI music through the MPU 401 compatible interface. With built-in support of legacy mode analog game port, the M1535D audio can replace all the functions of a wave table based legacy audio ISA card.

The M1535D will provide the AC'97 2.1 compliant digital controller interface for third parties (such as the AMC Codec's vendor) to enable the software modem solution. The M1535D provides 4 separate telephony bus master channels. One for modem output, one for modem input, one for handset input, and one for handset output. The M1535D supports the Modem on-demand variable sample rate transfer, power management, wake-up, and caller ID string transmission.



## M1535D Features

- **Provides a High Integration Bridge (with Audio, HSP Modem, Super I/O & Fast IR) between the PCI Bus and Peripheral Bus for Desktop Systems**
- **PCI 3.3V/5V Tolerance Interface**
  - Supports PCI Master and Slave Interface
  - Supports PCI Master and Slave Initiated Termination
  - Concurrent PCI Architecture
  - PCI spec. 2.2 Compliant
  - PCI Power Management Interface spec. 1.1 Compliant
- **Provides Steerable PCI Interrupts for PCI Device Plug-and-Play**
  - Up to 8 PCI Interrupts Routing
  - Level to Edge Trigger Transfer
- **Enhanced DMA Controller**
  - Provides 7 Programmable Channels, 4 for 8-bit Data Size, 3 for 16-bit Data Size
  - 32-bit Addressability
- **Interrupt Controller**
  - Provides 14 Interrupt Channels
  - Independent Programmable Level/Edge Triggered Channels
- **Counter/Timers**
  - Provides 8254 Compatible Timers for System Timer, Refresh Request, Speaker Output Use
- **Distributed DMA Supported**
  - 7 DMA Channels can be Arbitrarily Programmed as Distributed Channels
- **PC/PCI DMA Supported**
  - PC/PCI DMA Channel Interface Provided
- **Serialized IRQ Supported**
  - Quiet/Continuous Mode
  - Programmable (Default 21) IRQ/DATA Frames
  - Programmable START Frame Pulse Width
- **Plug-and-Play Supported**
  - 2 Programmable Chip Select
  - 2 Steerable Interrupt Request Lines
- **Built-in Keyboard Controller**
  - Built-in PS2/AT Keyboard and PS2 Mouse Controller
  - Swappable keyboard and mouse support
- **Supports up to 512 KB ROM Size Decoding**
- **PMU Features**
  - Full Support for ACPI and OS Directed Power Management to meet the system requirements of PC98/PC99 systems
  - Full Support for Instantly Available PC features
  - CPU SMM Legacy Mode and SMI Features Supported
  - Full Support for the Clock Control Functions of both Pentium and Pentium II CPUs.
  - Supports I/O Trapping for the I/O Restart Feature
  - PMU Operation States :
    1. G0 State
      - On
      - Standby Mode
    2. G1 State (Suspend Mode 1)
      - S1 State (Power On Suspend)
      - S2 State (Power On Suspend with CPU/L2 Context Lost)
      - S3 State (Suspend To RAM)
      - S4 State (Suspend To DISK)
    3. G2 State (Suspend Mode 2)
      - S5 State (Soft-Off)
    4. G3 State (Mechanical-Off)
  - APM State Detection and Control Logic Supported
  - Global and Local Device Power Control Logic
  - 4 Monitor Timers : Standby/ APMA~B/ Global-Display.
  - Provides System Activity and Display Activity Monitoring, including
    - Video
    - Audio
    - Hard Disk
    - Floppy Disk
    - Serial Ports
    - Parallel Port
    - Keyboard
    - 1 Programmable I/O Group
    - 1 Programmable Memory Space
  - Multiple External Wakeup Events for Standby Mode (G0)
    - Power Button
    - Sleep Button
    - Modem Ring
    - RTC Alarm
    - DRQ2
  - Resume Events Detected to Wake Up from Suspend Mode (G1, G2)
    - 9 resume events supported.
    - Power Button
    - Sleep Button
    - RTC Alarm
    - PCI PMEJ Signal

- Modem Ring
- USB Events
- AC' 97
- Hotkey KBD & MS
- IRQ1 & 12
- Thermal Alarm Supported
- Clock Generator Control Logic Supported
  - CPUCLK Stop Control
  - PCICLK Stop Control
- L2 Cache Power Down Control Logic Supported
- Up to 6 Run Time Events Supported.
  - Up to 8 General Purpose Input Signals, up to 8 General Purpose Output Signals and up to 7 General Purpose Input/Output Signals
  - All Registers Readable/Restorable for Proper Resume from Suspend State
  - Hotkey for Power on Function through Keyboard or Mouse
  - State/Event Remembering for Power Recovery
  - Supports Power Loss Recovery
  - Watch Dog Timer for
    - Setting a Bit in Register
    - Generating an SMIJ/SCI/NMI/INIT
    - Generating System Reset
- **Built-in PCI IDE Controller**
  - Supports Ultra DMA Mode Transfers up to Mode 4 Timing (66 Mbytes/sec)
  - Supports PIO Modes up to Mode 4 Timings, and Multiword DMA Modes 0, 1, 2 with Independent Timing for up to 4 Drives
  - Integrated 16 x 32-bit Read Ahead & Posted Write Buffers for each channel (Total : 32 DWords)
  - Dedicated ATA Interface signals for each Channel
  - Supports Tri-state IDE Signals for Swap Bay
  - Supports Command Queue IDE enhancement
- **USB Interface**
  - One Root Hub with four USB Ports based on the OpenHCI 1.0a Specification
  - Supports FS (12Mbits/sec) and LS (1.5Mbits/sec) Serial Transfer
  - Supports Legacy Keyboard and Mouse Software with USB-based Keyboard and Mouse
- **SMBus Interface**
  - System Management Bus Interface meets the V1.0 Specification
  - SMBALERTJ Support
- Hotkey for Power on Button Function through Keyboard
- **Super I/O Interface**
  - Supports Windows Plug-and-Play
  - Supports 2 Serial/ 1 Parallel/ FDC Functions
  - Supports 16-bit Address Decoder
  - Automatic Media Sense support
  - 2.88 MB (Formatted) Floppy Disk Controller
    - Software Compatible with 82077 and Supports 16-byte Data FIFOs
    - High Performance Internal Data Separator
    - Supports Standard 1 Mbps/ 500 Kbps/ 300 Kbps/ 250 Kbps Data Transfer Rate
    - Supports 3 modes of 3.5" FDD (720K/1.2M/ 1.44MB)
    - Swappable Drives A and B
    - Programmable 7-bit I/O Base Address
  - Various Mode Parallel Port
    - Standard Mode (SPP)
    - Programmable 8-bit I/O Base Address
    - Multiplexing of FDC Signals through the Parallel Port Pins
    - 12 IRQ Channel Options
    - 4 8-bit DMA Channel Options
    - IBM PC/XT, PC/AT and PS/2 Compatible Bi-directional Parallel Port
    - Enhanced Mode
      - Enhanced Parallel Port (EPP) Compatible
      - EPP is compatible with EPP1.9 (IEEE 1284 Compliant), also supports EPP1.7 of Xircom Specification
    - High Speed Mode
      - Microsoft and Hewlett Packard Extended Capabilities Port (ECP) Compatible
      - IEEE 1284 Compatible ECP
      - Includes Protection Circuit against damage caused when printer is powered up, or operated at higher voltages
  - Serial Ports
    - Three High Performance 16450/16550 Compatible UARTs with Send/Receive 16-byte FIFOs
    - Programmable Baud Rate Generator
    - Wireless Communications
    - Dedicated signals and COM Port for Infrared Transmission
    - Supports IrDA 1.0 (SIR) and IrDA 1.1 (MIR and FIR)
    - Supports Sharp-IR
    - MIDI (Musical Instrument Digital Interface) Compatible
    - High Performance Power Management for FDC, UART and Parallel Port
    - Option between Programmable 7-bit I/O Base Addresses, 12 IRQs, and 4 DMA Channels for each device

**■ Audio System**

- Fully Plug-and-Play PCI controller and software
- PCI 2.2 compliant bus master optimized for multiple stream operations
- On-chip per voice cache to minimize PCI bandwidth use
- Hardware multi-channel digital mixer
- 32 voices polyphony wavetable synthesizer supports all combinations of stereo/mono, 8-/16-bit, and signed/unsigned samples.
- Per channel for wavetable synthesis with envelop, pitch shift, tremolo and vibrato
- DLS1-compliant Downloadable Sample support
- DirectMusic with unlimited downloadable samples in system memory
- Legacy game audio with SoundBlaster Pro/16 compatibility
- Legacy game FM and wave table synthesis supported
- MPU-401 compatible MIDI I/O with FIFO
- High precision internal 26-bit digital mixer with 20-bit digital audio output
- Microsoft WDM streaming architecture compliant and "Re-routable endpoint" support
- 32-voices DirectSound channels
- 16-voices DirectSound3D accelerator with IID, ITD and Doppler effect on 3D positional audio buffers
- DirectSound accelerator with volume, pan and pitch shift control on streaming or static buffers
- DirectInput support with digital enhanced game port enables an analog joystick to emulate a digital joystick performance using DirectInput driver. This eliminates up to 12% CPU overhead wasted on joystick polling.
- DirectX timer for video/audio synchronization
- Hardware digital volume control

**■ Software Modem Interface**

- The M1535D provides the AC' 97 2.1 compliant digital controller interface for third parties (such as the AMC Codec' s vendor) to enable the software modem solution.
- 4 separate telephony bus master channels. One for modem output, one for modem input, one for handset input, and one for handset output.
- AC' 97 2.1 Modem variable sample rate support for "On Demand" sample transport scheme.
- AC' 97 2.1 GPIO signal status and control support.
- Power Management and wake-up event support
- Caller ID string transmission via AC-link support

**■ 352-pin (27mmx27mm) BGA Package**